A STUDY TO ASSESS EFFECTIVENESS OF OPHTHALMIC EXERCISES ON VISUAL DISCOMFORT AMONG COMPUTER WORKERS IN SELECTED COMPANY, BANGALORE.

BY

30093603

A DISSERTATION SUBMITTED TO THE TAMILNADU Dr.M.G.R. MEDICAL UNIVERSITY, CHENNAI, IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE IN NURSING

APRIL – 2011

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CERTIFIED THAT THIS IS THE BONAFIDE WORK OF

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ACKNOWLEDGEMENT

"*In all thy ways acknowledge Him and He shall direct thy path"*

Proverb 3:6

An effort of this academic pursuit would not have been a reality for me but for the constructive and purposeful support, guidance and encouragement rendered by a number of people whose help I specially recognize through this acknowledgement.

I am grateful to praise and thank the **LORD ALMIGHTY** for his abundant grace and providing me strength and his presence throughout this Endeavour.

"*Words cannot express the feelings in my heart. All that I am or ever hope to be, I owe to my angel parents."*

I dedicate this work to my beloved Parents **Mr.S.JOHN CORNELIUES** and **Mrs. JANSI JOHN**, and my nieces **CECILIA ABIGAIL** and **CELOSRYA ALUN.**

I owe my deep sense of gratitude to **Dr. J.K.K MUNIRAJAH** , Founder, Managing Trustee, Annai J.K.K Sampoorani Ammal College of Nursing for the facilities he had provided me in this institution during this course of my study.

"Great is the Master, Great is His Name. Whatever happens is according to His Will."

Guru Granth Sahib Ji

I am greatly indebted to my guide, **Dr. JEYASEELAN MANICKAM DEVADASON**, Dean, HOD – Nursing Research, Annai J.K.K Sampoorani Ammal College of Nursing, Komarapalayam who helped me to grow in the process of doing this work, who has always been there to patiently listen and to give his valuable suggestions, showing me the right track to proceed in this work. His constant support and utmost consideration was felt at the most needed moments of this work which invariably contributed his knowledge to unite the difficult knots of this research work.

I express my grateful thanks to **Prof. Dr. Mrs. TAMILMANI**, principal, Annai J.K.K Sampoorani Ammal College of Nursing, for her constant support, encouragement and guidance, and valuable hints she rendered during the course of this study.

I am indebted and will ever remain grateful to **Prof. Mrs. JESSIE SUDARSANAM**, M.Sc (N) HOD Department of Medical surgical Nursing, Annai J.K.K Sampoorani Ammal College of Nursing, for her valuable guidance and encouragement.

I am deeply indebted to the panel of expert valuators namely **Dr. A.KRISHNAN M.s.Do, Dr. RAJASEKARN Ms, Mrs. Dr. SARAAMA, Mrs. JESIEE SUDHARSANAM** and **Mrs. SHOBANA**, for giving their valuable opinions and suggestions for this study.

My grateful salutations to all **MY TEACHERS** who sowed the seeds of knowledge in me. I express my special thanks to **Mrs. SHOBANA** , Department of medical surgical nursing for her support and valuable suggestions throughout this study. I am also grateful to **Ms. SHEELA DEVI** Department of Pediatric nursing, **Mrs. KOWSALYA** Paediatric department for giving all her valuable suggestions and corrections. I submit my heartfelt thanks to **Ms. ALWIN** Department of Paediatric nursing and **Ms. KAVITHA** Department of Maternity nursing for benevolent guidance in my research.

I express my sincere thanks to **Mr. DHANAPAL**, statistician for his basic guidelines in statistics.

I extend a special thanks to the librarians, **Mr. JEYARAJ** and **Mr. EBENEZAR** of Annai J.K.K Sampoorani Ammal College of Nursing, and the librarians of Dr. MGR Medical University and CMC, Vellore for having provided me the books and journals as needed.

I express my sincere thanks to the office staffs, **MR. RAVIDASS** and **MRS.RUTH** for all the needed help.

I extend my deep rooted thanks to **Mr. M. SETURAMAN, Mr. V. MOHANRAJ, Mr. M. PALANISAMY** and **Mr. MANIKANDAN** who spend their valuable hours of work to shape this thesis neatly.

"Brothers and sisters are natural friends gifted by God"

I am also grateful to **my brother, Mr. VINOLIAN CHRISTOPHER and sister in-law Mrs. PRESANNA VINOLIAN** for their everlasting love and support and also for the words of encouragement offered during the period of my study.

I sincere in extending my loving gratitude to all of my friends and well-wishers especially *Ms. Kiruthika, Ms. Boja sibi, Ms. Jasmine, Mrs. Beulah, Mr.K. Shanmugam, Mr.D. Sivakumar, and media support by Mr.K.Murugesh,* for rendering their invaluable help illustrations, ideas and suggestions to make come out successful in all my efforts and endeavors.

Instruction does much, but encouragement does everything I wish to acknowledge **all my friends** who were equally instrumental in enabling me to complete this task.

I convey my special thanks to the **GENERAL MANAGER Mr. VISVANATH NACHUNDAYA** and **COMPUTER SOFTWARE WORKERS** for their cooperation and help during the study period.

To all my deepest thanks!

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Dedicated to

The almighty lord

To my most beloved Parents & Loving Brother

CHAPTER - I

INTRODUCTION

BACKGROUND OF THE STUDY

Vision is a complex perceptual process that is often mistakenly believed to be purely mechanical. The complexity of human vision means that almost a fifth of the brain is devoted to visual processing cells. Eye discomfort is a common health problem experienced by computer users. Often, people are unaware of existing visual problems that may only come to light when they begin using computers because the demand on the visual system of this work can be very high.

Asthenopia (visual discomfort) or eye strain is an ophthalmologic condition that manifests itself through nonspecific symptoms such as fatigue, pain in or around the eyes, blurred vision, headache and occasional double vision. According to Blehm C et.al.,(2005) Near point stress gives rise to the physiological condition known as "computer vision syndrome" (CVS), which consists of one or more of the following symptoms eyestrain, dry, tired, sore eyes; itchy, gritty sensations in and around the eyes, eyelid tics or spasms, blurred or double vision, loss of distance vision, headaches, fatigue, dizziness, sensations of being stressed out.

Toda et.al., reported that dry and irritated eyes and also contact lens problems are common among computer workers. This is because our blink rate is significantly reduced when working at a computer. The dry office environment also contributes to this problem. This results from using old computer monitors, and also from looking at the screen for too long In addition, there are now indications that heavy computer users are at risk for glaucoma.

Reducing visual discomfort appears to improve productivity at work. This was indirectly inferred, as adding regular breaks to the work schedule improved the efficiency between breaks and compensated for the extra time spent in breaks and modifying the computer location, the lighting and reflection, increasing humidity, the use of artificial tears or certain eye drops and eye exercises.

While eye exercises are crucial to the checking of eye strain associated with prolonged computer usage. After working on your computer for some time always remember to take a break in order to give your eye muscles an opportunity to loosen up and rejuvenate. Make it a point to do eye exercises on routine basis such eye exercises may also help prevent or fix eye disorders from causes other than the computer (Curt Fletcher)

NEED FOR THE STUDY

The visual symptoms which computer workers experience are the most obvious expression of the shortcomings in the ergonomics and visual characteristics of the worker. Most studies indicate that visual symptoms occur in 75-90% of computer workers at world wide.

According to Dr. Shirole T (2010), about in the past 2years CVS (computer vision syndrome) has experienced about 15%. The incidence of CVS about 5years ago was just 8%. Nowadays every 1 of 4 patients visiting ophthalmic OPD's because of CVS. The CVS cases have been witnessed among children addicted to video games and IT professionals. About 70% of the total CVS cases are contributed by IT professionals.

Bhanderi D J et.al.,(2008) conducted a study regarding A community-based study of asthenopia in computer operators. Among the 419 subjects studied, 194 (46.3%) suffered from asthenopia during or after work on computer. Marginally higher proportion of asthenopia was

noted in females compared to males. Prevalence of asthenopia was noted to be quite high among computer operators, particularly in those who started its use at an early age.

Recent studies have shown that about 85% of computer users suffer from vision syndrome. About 175 million working Americans are estimated to be suffering from computer eye strain. About 75% of people who work with computers, experience computer vision syndrome.

According to Keith L. M , a study conducted in India on a sample of 650 people in computer-dependent careers, revealed that 55% developed CRI(computer related injuries) symptoms, within a year 76% reported at least 1 symptom. In India , the major symptoms related to computer use reported by ophthalmologists were eye strain, headache, tiredness, burning sensation , watering, redness, blurred vision, dry and irritated eyes, and tired eyes (Bhanderi D J et.al.,2006).

The World Health Organization (WHO) also has published recommendations concerning the use and system design of VDTs (WHO, 1989). Together these suggest the need to design jobs including task analysis, training and skill enhancement, minimization of daily VDT use, and increase of the length of rests during VDT work.(Ye Z et.al., 2007). Among software development organizations worldwide, several are in Bangalore city (Telles S et.al., 2006).

To protect workers from the adverse effects of VDT, the Japanese Ministry of Labour has published guidelines for VDT work (Japanese Ministry of Labour, 1984; 2002). This helps to prevent visual discomfort while working with VDT.

Omori M et.al., done a study regarding “An attempt at preventing asthenopia among VDT workers. He evaluated the effects of Stretch Eye on asthenopia. The employees of 2 information technology companies were evaluated according to a visual analogue scale (VAS) for subjective symptoms of asthenopia and eyesight. The results showed that Stretch Eye was effective in easing visual fatigue due to VDT work and it improved eyesight under working conditions.

According to Beresford S M et.al.,(2007) the use of eye exercises and stress reduction techniques during rest breaks to relieve CVS was first proposed by the author in his 1988 monograph "How to Stop Computer Stress or Eyestrain" **(**Drs. Steven M et.al.,(1996). The use of eye exercises and rest breaks to relieve CVS was also proposed in the author's book "Improve Your Vision Without Glasses or Contact Lenses" .

Beresford S M et.al.,(2007) studied the Method of relieving computer vision syndrome. He conducted the intervention to relieve or avoid computer vision syndrome by means of eye exercises and stress reduction techniques. He suggested that people who suffer from CVS should use relaxation exercises and strengthening exercise until they become asymptomatic; in contrast people who do not suffer from CVS but want to avoid it should use strengthening exercises.

Based on the above scenario the investigator found that there are very few studies related to eye exercise for computer workers and visual discomfort. Among these studies many authors did not concentrate on specific eye exercises for reduction of visual discomfort which propelled the investigator to conduct a study , ophthalmic exercise on visual discomfort among computer workers at Bangalore.

STATEMENT OF THE PROBLEM

A study to assess effectiveness of ophthalmic exercises on visual discomfort among computer workers in selected company, Bangalore.

OBJECTIVES

1. To compare the mean pre test and post test visual discomfort among computer workers in experimental group in relation to ophthalmic exercises.

2. To compare the mean difference in visual discomfort among computer workers in experimental and control group

3. To find the association between background factors and mean difference in visual discomfort among computer workers in experimental and control group.

HYPOTHESIS

H_1 - There will be a significant difference in the mean visual discomfort among computer workers after ophthalmic exercises in experimental group.

H_2 - There will be a significant difference between the mean difference of visual discomfort among computer workers after ophthalmic exercises in experimental and control group.

H_3 – There will be a significant association between the mean difference in visual discomfort and background factors among computer workers in experimental group.

OPERATIONAL DEFINITIONS

1. Ophthalmic exercises : It refers to the relieving the symptoms of visual discomfort (asthenopia) with the help of certain ophthalmic exercises including, palming exercises, slow blinking, squeeze blinking, rotate the eye ball, gaze at eight directions. Exercise Information, programming instructions that display information on the computer screen about the exercises including descriptions, illustrations, and effects.

2. Effectiveness : Effectiveness means, result, outcome or change produced by an action. In this study the outcome in terms of difference in the visual discomfort with ophthalmic exercises in computer workers.

3. Visual discomfort : It refers to (asthenopia) or visual discomfort in which the presence of eye strain , blurred vision , ocular soreness , itching of the eyes , heaviness of the eyes , dryness of the eyes , blinking and double vision. It is measured by a visual discomfort structured questionnaire.

4. Background factors : These background factors refer to those factors which are thought to influence the mean difference in visual discomfort computer workers. The background factors were age, gender, educational qualification, experience, and work factors, detailed information about experiencing of various visual or musculoskeletal problems.

5. Computer workers : Refers to the individual who were employed as software computer workers in Soft bee private consultancy, Ltd, company, Bangalore.

ASSUMPTION

- The computer workers who cooperate during the study.
- The information provided by computer workers would be true.
- The items included in the tool will be adequate and represents the measure of the visual discomfort for computer workers.

DELIMITATION

- Computer workers available at the software company on the time of data collection.
- The computer workers in Soft bee private consultancy, Ltd company, Bangalore.
- Study is limited to the computer workers.

CONCEPTUAL FRAMEWORK

The present study is aimed to decrease the visual discomfort among computer workers. The conceptual framework of the study was derived from American Nurses Association published “standards of nursing practice”, which describes the five steps nursing process model (ANA 2003). The term nursing process was first introduced by Lydia Hall in 1955.

Nursing process is a systematic problem solving method for providing individualized care for clients in all states of health. Four basic steps are involved in the process.

ASSESSMENT

The nurse collects data from a variety of sources. This information is used for problem identification, so that the planning and implementation are appropriate to the clients need; it is also basis for accurate evaluation.

In this study, the assessment was done by using tools i.e. background factors and work factors, 5 point scale for visual discomfort assessment.

PLANNING

In this step of the process care plan is formulated. It is individualized, based on the assessment and nursing diagnosis. The care plan contains client goal with expected client outcome and appropriate nursing interventions and expected outcomes are the criteria used to evaluate the effectiveness of care. The investigator planned to give ophthalmic exercise to decrease the visual discomfort among computer workers in experimental group.

IMPLEMENTATION

It is the action step of the nursing process. During this step individualized client care is delivered according to the care plan. Interventions are continually modified as deemed necessary by an ongoing nursing assessment of the clients response.

In this study implementation refers to ophthalmic exercise to decrease visual discomfort among computer worker .ophthalmic exercise was practiced for two week.

EVALUATION

The nurse determines the client's progress towards meeting expected outcomes and achieving goals and the success of the nursing intervention. This step provides for the revision of the nursing care plan as and when necessary to resolve the client's problem.

In this study, evaluation had been done by the post tests visual discomfort score among computer workers after practicing ophthalmic exercise.

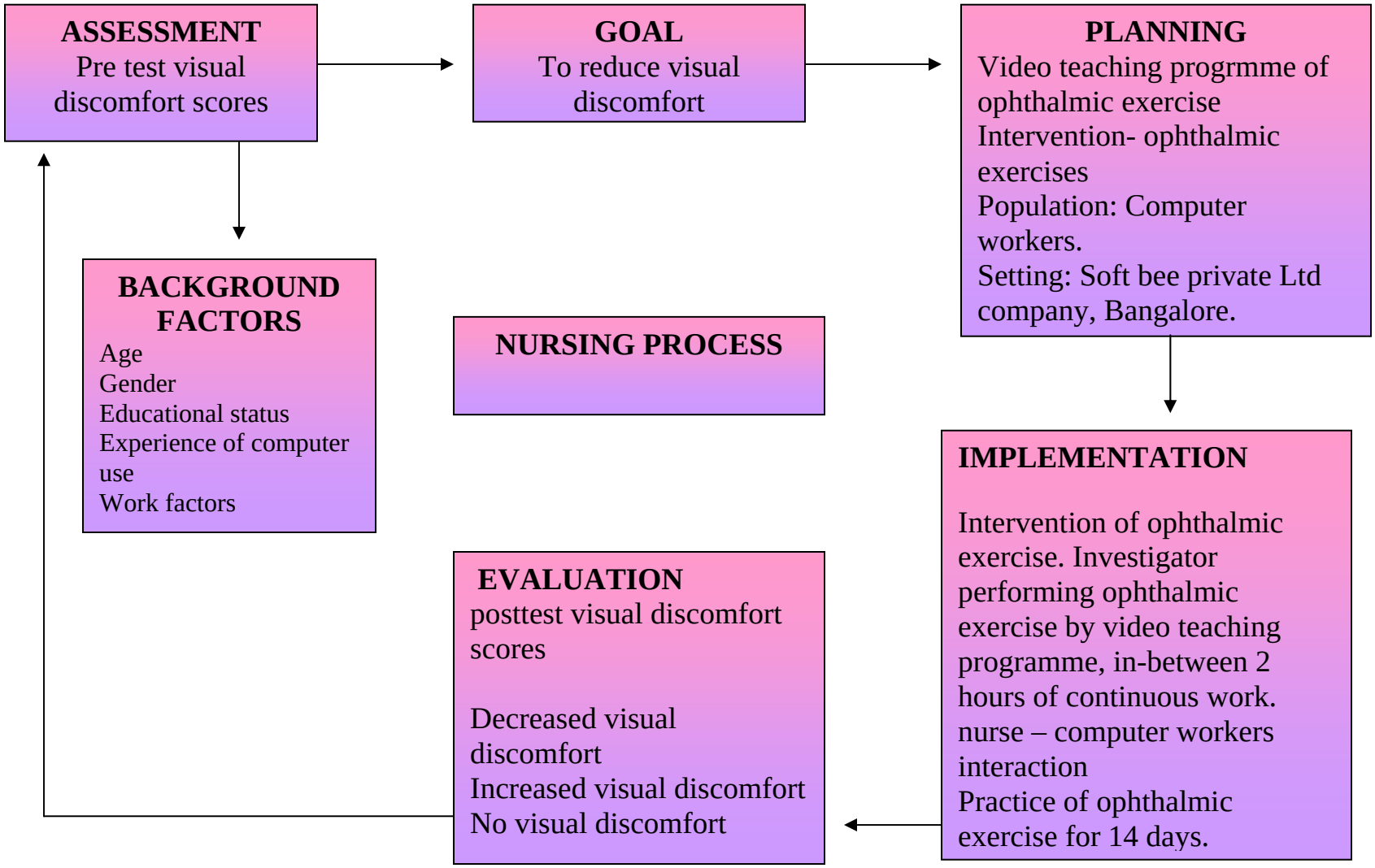

Fig:1 CONCEPTUAL FRAME WORK BASED ON NURSING PROCESS MODEL–ANA(2003)

CHAPTER – II

REVIEW OF LITERATURE

The review of literature on related studies helped the investigator to design the methodology, conceptual framework and develop the tool. The literature review was presented under the following heading.

1. Studies related to visual discomfort among computer workers.
2. Studies related to Healthful working environment among computer workers.
3. Studies related to effectiveness of ophthalmic exercises for visual discomfort among computer workers.

1. STUDIES RELATED TO VISUAL DISCOMFORT AMONG COMPUTER WORKERS

Bhanderi D J et.al.,(2008) conducted a study regarding A community-based study of asthenopia in computer operators. Community-based cross-sectional study of 419 subjects was selected randomly. The subjects (n = 419) were asked to fill a pre-tested questionnaire, after obtaining their verbal consent. Simple proportions and Chi-square test was used for analysis. Among the 419 subjects studied, 194 (46.3%) suffered from asthenopia during or after work on computer. Prevalence of asthenopia was quite high among computer operators, particularly in those who started its use at an early age. Individual as well as work-related factors were found to be predictive of asthenopia.

Helland M et.al.,(2008), done a study on Musculoskeletal, visual and psychosocial stress in VDU operators after moving to an ergonomically designed office landscape. A structured questionnaire used for 34 Visual Display Unit (VDU) operators reported significantly

worsened condition of lighting and glare in addition to increased visual discomfort. Glare was significantly correlated with visual discomfort, r=0.35. In a regression analysis, the visual discomfort explained 53% of the variance in the neck and shoulder pain. A marked drop in eye blink rate , psychosocial conditions and work factors was worse. In this study, visual discomfort is clearly associated with pain in the neck and shoulder area.

Iwakiri K et.al.,(2004), conducted a Survey on visual and musculoskeletal symptoms in VDT workers. A self-reported questionnaire was distributed to 3,927 office workers; 2,374 (60.5%) responded. By a logistic regression model, Prevalence of eye strain and/or pain (72.1%) was the highest, followed by neck stiffness and/or pain (59.3%). Women consistently reported more discomfort than men. Although measures to prevent fatigue had been implemented for VDT workers.

Hsu WH et.al., (2003) emphasized on a Physical discomfort among visual display terminal users in a semiconductor manufacturing company. A cross-sectional study of 119 video display terminal (VDT) users, were identified using self-reported questionnaire surveys. Multivariate logistic regression models were used. Full-time VDT users had significantly higher rates of physical discomfort (66%) than part-time VDT users (41%). He concluded both physical/ergonomics variables and psychosocial factors were associated with visual and musculoskeletal discomfort. physical/ergonomic design improvements is an effective approach to reducing the prevalence of discomfort.

Mocci F et.al.,(2001), conducted a study on psychological factors in complaints about visual health reported by 385 bank workers. Three questionnaires were administered to subjects. Correlation and multiple regression analyses were performed to examine for the presence of predictors of asthenopia. Social support, group conflict, self esteem, work satisfaction, and under use of skills were found to be predictors of visual complaints; social support played a part also as a moderating factor in the stress and strain model; this model

accounted for 30% of the variance. Some part of the complaints about visual health reported by VDT workers are likely indirect expressions of psychological discomfort related to working conditions.

Nakaishi H et.al., (1999) was reported about the relation between the prevalence of dry eye syndrome and subjective symptoms of asthenopia in (VDT) operators. Total 722 VDT workers (242 workers with symptoms of asthenopia and 480 control group without such symptoms. In this study workers had 30% of symptoms were found to meet the criteria of dry eye, and the odds ratio compared with the controls was 4.61 ($p<0.001$). This odds ratio was significantly greater than that obtained for refractive errors (2.31). The profound association of dry eyes with symptoms of asthenopia could be verified.

Basrai F et.al.,(1998), conducted a study to determine the effects of VDT monitor positions and the use of single vision versus bifocal glasses. Eight male subjects performed data entry using a word processor in eight half-hour sessions with the four different monitor placements, i.e. "eye-level", “shoulder-level-front", "shoulder-level-side", and "sunken-level", wearing the two types of glasses. A questionnaire covering 12 somatic elements was completed by the subject after each session. The neck-back discomfort scores were highest at the "eye-level", lowest at the "sunken-level", and intermediate at the "shoulder-level-side" position. The eyestrain was significantly greater with the bifocal than with the single vision glasses. He concluded, the VDT operators were advised to avoid the "eye-level" and "shoulder-level-side" positions and to prefer the "sunken-level" and "shoulder-level-front" positions as the first and second best choices, respectively.

. **Lie I et.al., (1994)**, conducted a study on VDT work, occulomotor strain, and subjective complaints. He examines the effect of three hours of continuous VDT work on a set of optometric and health-related variables in an experimental (n = 18) and control group (n = 19). Experimental group doing the same keyboard activities for 3 hours, the control group was

looking out of a window instead of at the display while working (distance viewing). There were significant group differences in work related effects on the eyes ciliary and extra ocular muscles and on subjective symptoms, indicating that not only visual symptoms but also muscle pain in the head, neck, and upper back regions may result from near-point induced occulomotor strain. There is a significant pre-post reduction in symptoms, indicating that visual anomalies contribute to work-related symptoms.

Bergqvist D et.al.,(1994) done a study on Eye discomfort and work with visual display terminals. Three hundred and twenty-seven office workers and their work stations were investigated by means of questionnaires and worksite investigations. A multivariate logistic regression analysis was used. The occurrence of eye discomfort increased as the extent of VDT work increased, as did the specific symptoms of sensitivity to light and smarting, gritting feeling, or redness. Increased odds ratios for certain eye discomfort symptoms. The use of a VDT in routine office work is associated with an increased occurrence of certain eye discomfort symptoms. This association is affected also by the presence of certain other individual and ergonomic factors.

Faucett J et.al.,(1996) Musculoskeletal symptoms related to video display terminal use has been associated with the increasing incidence of upper extremity musculoskeletal disorders, often called cumulative trauma disorders. In this study of newspaper reporters and copy editors (n = 83), VDT use was measured with employee self reports and by sampling the work behaviors of a sub sample of employees. Behavioral sampling estimated VDT use as a characteristic of the job as opposed to a characteristic of individual employee performance. Overall, the two techniques of measuring occupational VDT use compared favorably, with the exception that self reported hours of VDT use tended to exceed the hours of use estimated by behavioral observation for employees who were younger and those who reported greater job demands. The findings suggest that behavioral sampling is a valid technique for estimating VDT use as a job characteristic.

2. STUDIES RELATED TO HEALHFUL WORKING ENVIRONMENT AMONG COMPUTER WORKERS

Larsen M K et.al., (2009) done a study regarding, a solution for avoiding neck-shoulder pain during computer work. This study was to investigate short-term effects of a high intensity contraction on productivity. Nearly 18 female computer workers performed 2 sessions of 15 min standardized computer mouse work preceded by 1 min pause with and without prior high intensity contraction of shoulder elevation. ANOVA with Bonferroni corrected post-hoc tests was applied for the statistical analyses. The high intensity contraction reduced the relative rest time of the uppermost (clavicular) trapezius part during the subsequent pause from computer work ($p < 0.04$). Then he concluded that implementation of high intensity contraction during computer work to prevent neck-shoulder pain may be possible without affecting the working routines.

Ye Z et.al.,(2007) conducted a study regarding Influence of work duration or physical symptoms on mental health among Japanese visual display terminal users. The mental health status of 2,327 VDT users was investigated using the 12-item General Health Questionnaire (GHQ-12). Logistic regression analysis was used to evaluate the associations with mental health status (GHQ-12 scores). The mean age of subjects was 39.5 yr (SD=10.3). Among all subjects, 36.7% could rest during VDT work and 66.9% received breaks during VDT work. The proportion of subjects who reported eyestrain were 19.6% and 25.7%, respectively. Eighteen percent of subjects were classified into a GHQ-12 high score group. Analysis showed that age less than 40 yr, not receiving breaks during VDT work, and the presence of eyestrain and musculoskeletal pain were significantly associated with poor mental health status. Using a VDT for more than 5 h/d and being female were also marginally associated with high GHQ scores ($p<0.1$). He concluded, the management of physical health as well as work duration is important for good mental health status among VDT users.

Hayes JR et.al.,(2007), conducted a study on "Computer use, symptoms, and quality of life", among 1000 university employees. They were assessed with visual and physical symptoms. Data were analyzed to determine whether self-reported eye symptoms are associated with perceived quality of life. According to multiple regression analysis 70% of the employees used some form of vision correction during computer use, 2.9% used glasses specifically prescribed for computer use, and 8% had refractive surgery. The latent variable eye symptoms was significantly associated with a composite quality of life variable ($p = 0.02$). After adjusting for ergonomics corrections, hours at the computer use, and exercise, eye symptoms were significantly associated with physical symptoms ($p < 0.001$) accounting for 48% of the variance. Environmental variability at work was associated with eye symptoms and eye symptoms demonstrated a significant impact on quality of life and physical symptoms.

Ye Z et.al.,(2007) conducted a study regarding the influence of visual display terminal use on the physical and mental conditions. The survey among 3070 workers aged 18 to 67 years (mean, 39.9 years) at a prefectural administrative office, in which 76% of subjects were visual display terminal (VDT) users. He examined the relationship between duration of daily VDT use and eyestrain, neck or upper extremity pain, back pain, and mental health, and estimated the effect of breaks and rest during VDT work on these symptoms. The 12-item General Health Questionnaire was used to identify potential poor mental health status. 17% of subjects reported eyestrain, 19.1% reported upper extremity pain, 11.6% reported back pain, and 17% of subjects had GHQ-12 scores of 4 or higher. Logistic regression analysis showed that duration of daily VDT use and lack of breaks and rest during VDT work were significantly associated with eyestrain, neck or upper extremity pain, back pain, and psychological distress.

Brewer S et.al.,(2006) conducted a study regarding Workplace interventions to prevent musculoskeletal and visual symptoms and disorders among computer users a systematic review. The researcher examining the effects of workstation, eyewear and behavioral interventions on musculoskeletal and visual symptoms among computer users. The initial

search identified 7313 articles which were reduced to 31 studies based on content and quality. Overall, a mixed level of evidence was observed for the general question. For all other interventions mixed or insufficient evidence of effect was observed. Few high quality studies were found that examined the effects of interventions in the office on musculoskeletal or visual health.

Bernaards C M et.al.,(2006) stated Neck and upper limb symptoms are frequently reported by computer workers. The RSI Work study is a randomized controlled trial that aims to assess the added value of a lifestyle physical activity. Computer workers from 7 Dutch companies with frequent or long-term neck and upper limb symptoms in the preceding six months are randomized into three groups work style group, work style and physical activity group, or control group. The intervention consist of workplace adjustment and to improve body posture, the number and quality of breaks and coping behavior with regard to high work demands. The control group receives usual care. Result of this study will be one of the first to assess the added value of a lifestyle physical activity intervention in addition to a work style intervention in reducing eye strain, neck and upper limb symptoms of computer workers.

Demure B et.al., (2000) reported the effects of an ergonomic intervention on musculoskeletal discomfort in 118 video display terminal (VDT) users were assessed 1 year after intervention. The intervention consisted of recommended changes to workstations, which were based on the evaluation of 15 ergonomic characteristics. Reduction in discomfort was substantial and was highest for the wrist/hand (57%), lower back (43%), and neck/shoulder (41%) severity of discomfort outcomes. Neither compliance with intervention on individual workstation characteristics nor summary intervention scores were associated with reduction in discomfort. He concluded that although reduction of musculoskeletal discomfort may be observed in the context of an intervention study, it may be difficult to link these benefits to specific interventions.

3. STUDIES RELATED TO EFFECTIVENESS OF OPHTHALMIC EXERCISES FOR VISUAL DISCOMFORT AMONG COMPUTER WORKERS

Mandal G M et.al.,(2007), conducted a study regarding Computer Vision Syndrome (CVS) and the Effects of Yoga Eye Practice. A group of 14 adults were selected randomly, these included 10 males and 4 females in the age group of 20-45. A questionnaire was sent to banks, private offices, ultrasonography centres and computer training institutes by the study team. The yogic eye practices include preparatory eye exercises and types of palming was done after each practice. Out of 13 participants, the TBUT test results showed an average improvement of 4 seconds (± 2) in the right eye of 10 participants, and an average improvement of 5 seconds (± 2) in the left eye of 10 participants. The control group showed no improvement. The statistically significant paired't' test result obtained for increased tear break up, shows that yogic eye practices definitely help in improving the tear film of the eyes, thereby reducing the symptoms arising out of computer use.

. **Beresford S.M. et.al.,(2007)**, Method of relieving computer vision syndrome .This invention comprises a method to avoid computer vision syndrome by means of eye exercises and stress reduction techniques. He stated one aspect of the intervention consists of a computer program that displays eye exercises on the computer screen. Another aspect of the intervention is a computer program that displays information on the computer screen about computer ergonomics, the visual system, near point stress, and computer vision syndrome, reminding the user to perform stress reduction techniques. He determined that certain groups and sequences of exercises produce the best results. He suggested that people who suffer from CVS should use relaxation exercises and strengthening exercise until they become asymptomatic; in contrast people who do not suffer from CVS but want to avoid it should use strengthening exercises.

Galinsky TL et.al.,(2007) done a field study of supplementary rest breaks for data-entry operators. Workers alternated between a 'conventional' and a 'supplementary' schedule in 4-week intervals. The conventional schedule contained a 15-min break during the first half of the work shift and a 15-min break during the second half of the shift. The supplementary schedule contained the same two 15-min breaks, and a 5-min break during each hour which otherwise did not contain a break, for a total of 20 extra minutes of break time. Results are based on data from 42 workers. He indicated that discomfort in several areas of the body, and eyestrain, were significantly lower under the supplementary than under the conventional schedule. While symptoms increased from pre- to post-work periods under both schedules, the magnitude of the increases was significantly less under the supplementary schedule.

Telles S et.al.,(2006) done a study on Effect of yoga exercise on self-rated visual discomfort in computer users. Structured questionnaire was used among 291 professional computer users from Bangalore were randomly assigned to two groups, yoga (YG, n = 146) and wait list control (WL, n = 145). The 60 minute yoga program included postures (15 minutes), regulated breathing (10 minutes), exercises for the joints (10 minutes), visual cleansing exercises (trataka, 10 minutes), and guided relaxation (15 minutes). WL group did their usual recreational activities .While the scores for visual discomfort of both groups were comparable at baseline, after 60 days there was a significantly decreased score ($F=15.36, P<.001$)in the YG group, whereas the WL group showed significantly increased scores. The results suggest that the yoga practice and visual cleansing exercise appeared to reduce visual discomfort.

Ziemssen F et.al., (2005) studied Blinking activity during visual display terminal work. The development of an individual blinking animation promises long-lasting increase and harmonization of lid movements during visual display work. Maintenance of the integrity of the ocular surface by preventing surface evaporation and providing sufficient precorneal environment eradicates important pathogenic factors of ocular discomfort. An animation

program for stimulation of blinking has been developed. First results showed that an increase in blinking rate initiated by the computer itself is feasible in principle during work at a visual display terminal.

Sjogren T et.al., (2005) conducted a study on Effects of a workplace physical exercise intervention on the intensity of headache and neck and shoulder symptoms and upper extremity muscular strength of office workers. The cross-over design consisted of physical exercise intervention (15 weeks) and no-intervention (15 weeks). The subjects (n=53) were office workers. Pain symptoms were measured using the Borg CR10 scale and muscular strength with a 5RM test. Statistical analyses were based on linear mixed models. Physical exercise intervention resulted in a slight, but statistically significant, decrease in the intensity of headache and neck symptoms. The mean decrease in headache during the 5-week period was 0.64 (P=0.001) or 49 (P=0.002). He concluded that Specific exercise may be clinically important to alleviate headache and neck symptoms.

Omori M et.al., (2003) done a study regarding "An attempt at preventing asthenopia among VDT workers. He report the results of 3 surveys of VDT users who took a mini break during which they viewed a stereoscopic image. The employees of 2 information technology companies were evaluated according to a visual analogue scale (VAS) for subjective symptoms of asthenopia and eyesight.The single image stereogram method employed is called Stretch Eye (TM), and he evaluated the effects of Stretch Eye (TM) on asthenopia. An accommodative relaxation of about 1 D was observed in participants while they were gazing at the image. The results showed that Stretch Eye (TM) was effective in easing visual fatigue due to VDT work and it improved eyesight under working conditions.

Balci R et.al., (2003) done a study regarding the effect of work-rest schedules and type of task on the discomfort and performance of VDT users. An experiment was conducted with 10 male college students as participants. The methodology included a discomfort questionnaire and performance measures. The independent variables were the work-rest schedule (60-minute work/10-minute rest, 30-minute work/5-minute rest, and 15-minute work/micro breaks) and the type of task (data entry and a mental arithmetic task). The results were analyzed using multiple analysis of variance followed by separate analyses. The data entry task resulted in significantly increased speed, accuracy, and performance, and lower shoulder and chest discomfort than the mental arithmetic task.

CHAPTER – III

METHODOLOGY

The present study was conducted on effectiveness of ophthalmic exercises on visual discomfort among computer workers in selected company, Bangalore.

RESEARCH APPROACH

Talbot (1995) defines research approach as logical, orderly and objective means of generating and testing ideas. The research approach is the most essential part of any research to find out how well a programme, treatment, practice and policy is effective. In this study visual discomfort before and after ophthalmic exercise were evaluated.

RESEARCH DESIGN

The research design selected for the study was a quasi experimental research design. The study intended to assess the effectiveness of ophthalmic exercises on visual discomfort among computer workers. The design had an intervention through ophthalmic exercise. The effect was compared with a control group. To be precise, the design used was a non equivalent control group pretest posttest design.

RESEARCH DESIGN NOTATION

GROUP	BEFORE	INTERVENTION	AFTER
E	O_1	X	O_2
C	O_3	-	O_4

E – Experimental group

C – Control group

O – Observation

X - Intervention

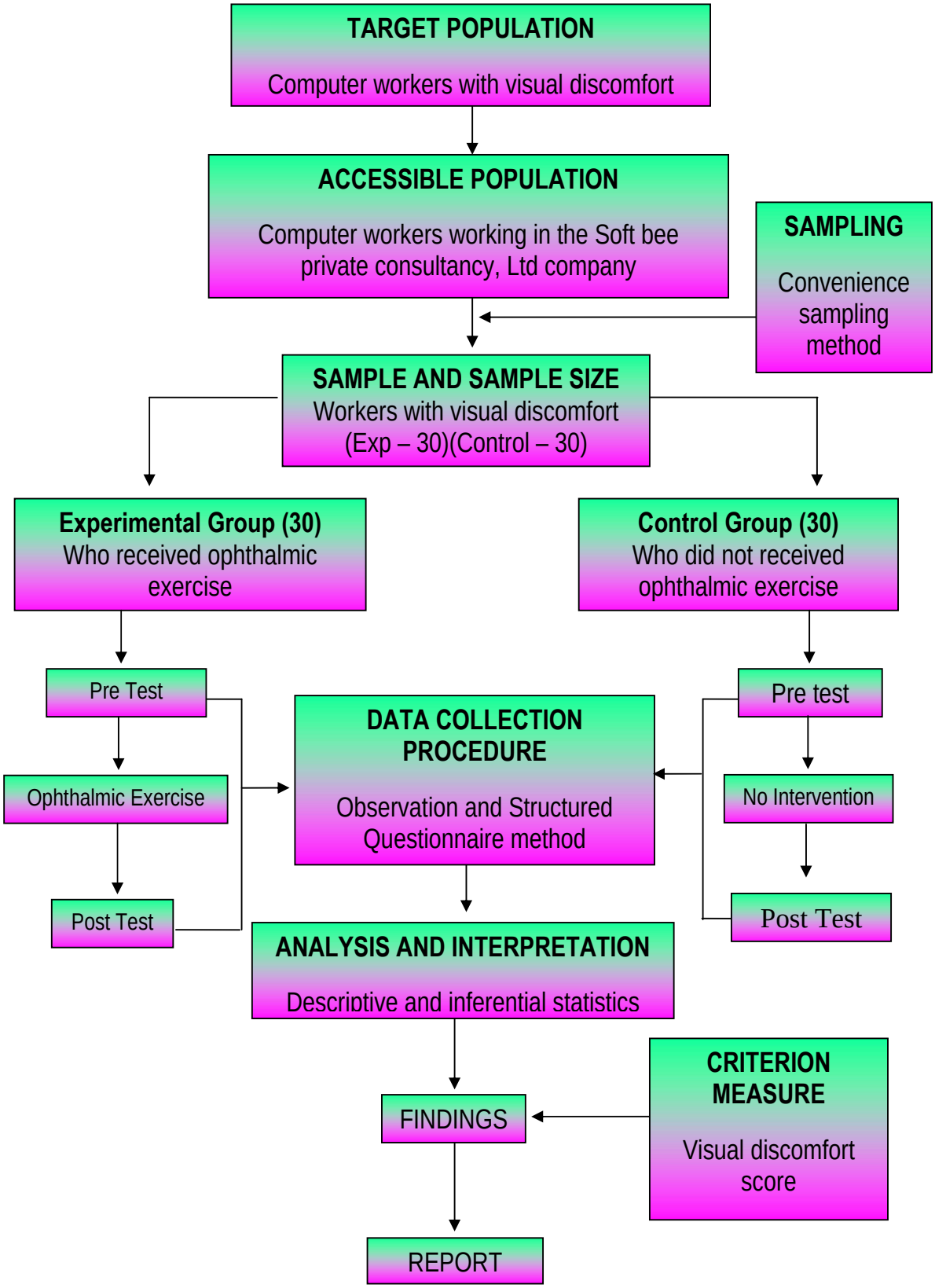

FIG.2: SCHEMATIC PRESENTATION OF RESEARCH DESIGN

VARIABLES

The variables identified for the study include:

Independent variable : Ophthalmic exercise

Dependent variable : Visual discomfort complaints

Associate variable : Age , sex, educational status , experience in computer use , details of working factors , detailed information about experiencing of various visual or musculoskeletal problems .

SETTING OF THE STUDY

The study was conducted in the Soft bee private consultancy Ltd company, Bangalore. The proximity, availability of samples, acquaintance of the researcher with the area and the co-operation from the higher authorities were the reasons to select this setting.

POPULATION

Target population refers to a set of individuals or objects for which the researcher wishes to generalize findings. The target population in the present study were the computer workers.

The accessible population for the present study were the Computer workers working under the Soft bee private consultancy , Ltd company , Bangalore.

SAMPLE AND SAMPLE SIZE

The sample for the present study were Computer workers working under the soft bee private consultancy, Ltd company, Bangalore. 30 experimental 30 control group were recruited in the study considering the nature of data collection.

SAMPLING TECHNIQUE

Sampling is a process of selecting a subject of population in order to obtain information regarding a phenomenon in a way that represents the entire population. The samples were selected using convenience sampling technique.

Experimental group (30)		**Control group (30)**	
Male	Female	Male	Female
13	17	22	8

SAMPLE SELECTION CRITERIA

The study samples were selected by the following criteria

Inclusive criteria

- Those who working with computer for at least 6 hours.
- Computer worker who were willing to participate.
- Who could read and write English.
- Both male and female software workers.
- Those who present at the time of data collection.

Exclusive criteria

- Computer workers with other vision problems or disease conditions like cataract, conjunctivitis, etc.
- Those who have already practicing eye related exercise.
- Who were absent during data collection.

DESCRIPTION OF TOOL

A structured questionnaire was prepared based on the past experience of the researcher, related review of literature and the opinions of the subject's experts. For the purpose of the study the investigator developed the items to collect the data regarding the background factors, work factors, and data on visual discomfort used with structured questionnaire. The tool was used in English language. The average time to complete one questionnaire was 5-10 minutes. The questionnaire had two sections

Section A- background factors, and work factors consisting of 20 items seeking information about the computer workers. This section sought information on background factors such as Age , Sex , Educational qualification, Years of experience in computer use, and work factors include hours of computer use per day, work time, working environment, break, blink status during video display terminal (VDT) work, treatment for dry eye, Using of antiglare spectacles, corrective spectacles, computer screen distance, visual acquity for right eye and left eye was measured using snellon chart.

Section B – Data on visual discomfort, which consisted of 20 statements regarding the visual discomfort complaints. The response was recorded in a five point scale like Never - 0, Rarely - 1, Sometimes - 2, Frequently - 3, Constantly – 4.

SCORING

The visual discomfort complaint of software workers was measured in terms of visual discomfort score. There were totally 20 items in the visual discomfort questionnaire, the maximum score was 80, 5 scores were given like Never – 0, Rarely – 1, Sometimes – 2, Frequently – 3, Constantly – 4. The higher score, the visual discomfort complaints was high among computer workers.

CONTENT VALIDITY

The tool constructed by the investigator was sent along with request for validation to 3 nursing experts, two ophthalmologist. The suggestions were considered and modification of the tool was done according to the opinion of the experts. The constructed tool was in English.

VALIDITY OF THE OBSERVATION

Validity of the use of snellon chart was done by 2 nursing experts. Individual visual acquity for right eye and left eye was checked by the investigator and the nursing expert one after another. There was more than 80% aggrieving..

VALIDITY OF THE VIDEO TEACHING PROGRAME

A video teaching programme was made to educate the computer workers about ophthalmic exercise on visual discomfort. The video teaching programme consisted of one video which was sourced from www.natural eye care.com. The content of the video was assessed for its clarity, sequence and adequacy by 3 nursing experts and 2 media experts.

RELIABILITY

The tool consisted of one instrument on visual acquity using snellon chart was established by 2 nursing personnel. The tool Reliability was established by test retest method. 10 computer workers were chosen from the same setting and the tool was administered twice, with the gap of 14 days. The reliability quotient was 0.87. The tool was found to be reliable.

PILOT STUDY

The structured tool was administered on 10 computer workers who filled the criteria for sample selection, for clarity and understanding of the questionnaire was measured. The duration of pilot study was 14 days. Pilot study helped the investigator to ascertain the feasibility and practicability of the designed methodology. The average time taken for completing the questionnaire was 10 minutes. This helped to find the feasibility of the tool for language, clarity, sequence and appropriateness of items. The samples in the pilot study were not included in the main study.

DATA COLLECTION PROCEDURE

Formal approval was obtained from the authorities of selected software company. The data was collected for four weeks in the month of October 2010 from Computer workers working under the Soft bee private consultancy Ltd Company, Bangalore. A total of 60 samples, 30 experimental, 30 control group were recruited for the study using convenient sampling technique. Initial rapport was established. Explanation on the purpose of the study was done. Informed consent was taken.

Data on background factors, work factors and visual discomfort complaints was filled by the computer workers. Confidentiality of the information shared was assured. The computer workers were very cooperative. On an average the pretest questionnaire it took 5 - 10 minutes to complete for one sample.

The video package was programmed and installed in each of 30 office computers viewed by the workers.. The video package shown to the experimental group regarding ophthalmic exercise for computer workers on the same day. The video package was shown in between every two hours, by the investigator. The computer workers were given with prior information about whenever they feel visual discomfort, they can practice this exercise. The average time taken for doing this exercise was 5 minutes. The practice was evaluated and posttest was done after 14 days. During these 14 days, the practices on ophthalmic exercise among computer worker were observed by the investigator in the office environment. All the subjects were very much cooperative and the investigator expressed her gratitude for their cooperation. The tool was checked for completion.

PLAN FOR ANALYSIS

Data analysis was planned to include both descriptive and inferential statistics. The following plan of analysis was developed.

- Frequency, percentage distribution, and chisquare was used for the analysis of background factors.
- Mean, standard deviation, range, mean differences , difference in mean difference, “t” test and confidence interval was used to compare the visual discomfort among computer workers in experimental and control group.
- Linear regression was used to find out the association between visual discomfort and selected background factors among the computer workers in experimental group.

ETHICAL ISSUES

The research problem and the objectives were approved by the research committee. Proper explanation regarding the purpose of the study and the nature of the questionnaire involved in the study design was given. Due permission from the institutional authorities was sought and informed consent was taken. No physical or psychological harm was caused.

CHAPTER – IV

DATA ANALYSIS AND INTERPRETATION

The analysis and interpretation of data of this study was based on data collected by self administered questionnaire. The results were computed using descriptive and inferential statistics. The data were entered into excel sheet and analyzed using SPSS 17 version. A probability of less than 0.05 was considered to be significant.

THE OBJECTIVES OF THE STUDY

- To compare the mean pre test and posttest visual discomfort among computer workers in experimental group in relation to ophthalmic exercises.
- To compare the mean difference in visual discomfort among computer workers in experimental and control group.
- To find the association between background factors and mean difference in visual discomfort among computer workers in experimental and control group.

The data were analyzed and organized under the following headings:

Section I : Data on background factors of computer workers

Section II : Data on mean pre and post test visual discomfort among computer workers in experimental group.

Section III : Data on mean difference in visual discomfort among computer workers in experimental and control group.

Section IV : Data on association between visual discomfort among computer workers and their background factors in experimental group.

SECTION – 1 :DATA ON BACKGROUND FACTORS OF COMPUTER WORKERS IN THE EXPERIMENTAL AND CONTROL GROUP

Table – I

Frequency , percentage and chisquare distribution of computer workers according to the background factors in experimental and control group.

Background Factors	Experimental group N=30		Control group N=30		χ^2
	No	%	No	%	
Age					1.45
less than 25 years	5	16.7	2	6.7	(p=0.228)
More than 25 years	25	83.3	28	93.3	NS
Gender					5.55
Male	13	43.3	22	73.3	(p=0.18)
Female	17	56.7	8	26.7	NS
Educational qualification					1.66
Bachelors degree	26	86.7	22	73.3	(p=0.197)
Master's degree	4	13.3	8	26.7	NS
Computer use / day					
6 – 7 hours	22	73.3	23	76.7	0.089
> 7 (More than 7 hours)	8	26.7	7	23.3	(p=0.766) NS
Break during Video Display Terminal work					
No break	0	0	0	0	
5 minutes at each one hour intervals	13	43.4	7	23.3	4.056
10 – 15 minutes breaks between 2 hours of continuous work	16	53.3	23	76.7	(p=0.132) NS
One hour at the end of the work period	1	3.3	0	0	

Using of these break times to refresh your eyes					
Walking with in the office	9	30	12	40	1.841
Looking nearby objects away from the monitor	8	26.7	10	33.3	(p=0.398) NS
Relax and keeping the eyes closed	13	43.3	8	26.7	
Working room illumination					
Very poor illumination	0	0	0	0	
Very high illumination	0	0	0	0	NIL
Good illumination	30	100	30	100	
Glittering or glaring of screen					
No glare	21	70	16	53.3	1.763
Too dull	0	0	0	0	(p=0.184)
Too bright	9	30	14	46.7	NS
Level of Air cooling and central heating of the workplace					
a. Mild	20	66.7	18	60	0.287
b. Moderate	10	33.3	12	40	(p=0.592
c. Severe	0	0	0	0	NS
Humidity of the workplace					
a. Mild	24	80	21	70	0.800
b. Moderate	6	20	9	30	(p=0.371
c. severe	0	0	0	0	NS
Distance between seat and screen during work time					0.071
a. 10- 15 inches	19	63.3	18	60	(p=0.791
b. 16 – 20 inches	11	36.7	12	40	NS
Distance between Eye level of screen					
a. Above the eye level	0	0	0	0	
b. At the eye level	30	100	30	100	NIL
c. Below the eye level	0	0	0	0	

Using of corrective spectacles					
Yes	14	46.7	17	56.7	0.601
No	16	53.3	13	43.3	(p=438)
					NS
Using of antiglare spectacles					
Yes	0	0	0	0	NIL
No	30	100	30	100	
Antiglare computer screens					
Yes	28	93.3	10	33.3	23.254
No	2	6.7	20	66.7	(p=0.001)S
Visual acquity for Right eye (measured with glass)					
6/6(normal)	16	53.3	11	36.7	
6/9	2	6.7	0	0	6.393
6/12	2	6.7	5	16.7	(p=0.172
6/18	10	33.3	12	40	NS
6/24	0	0	2	6.6	
Visual acquity for Left eye (measured with glass)					
6/6(normal)	16	53.3	11	36.7	
6/9	2	6.7	0	0	6.393
6/12	2	6.7	5	16.7	(p=0.172
6/18	10	33.3	12	40	NS
6/24	0	0	2	6.6	

Table 1, shows the frequency , percentage , and chi-square value of background factors in experimental and control group.

Majority of the computer workers in the study were in the age group of more than 25 years 25(83.3%); were females 17(56.7%); had Bachelors degree 26(86.7%); had more than 3 years of experience in computer use 22(73.3%); had 6-7 hours of computer use/day 22(73.3%); had day shift working time 17(56.7%); had 10-15 minutes of breaks between 2

hours of continuous work 16(53.3%); had practicing of relax and keeping the eyes closed 13(43.3%); had once in every 10 seconds of blink rate 25(83.3%), had good illumination 30(100%); reported no glaring of computer screen 21(70%); reported mild level of air cooling and central heating of the work place 20(66.7%); reported mild humidity of the workplace 24(80%), had seated at 10-15 inches distance 19(63.3%); reported distance at the eye level 30(100%); they are not taking any treatment for dry eye 16(53.3%); not using corrective spectacles 16(53.3%); they are not using antiglare spectacles 30(100%); had antiglare computer screen 28(93.3%); had visual acquity for right eye 16(53.3%); had visual acquity for left eye 16(53.3%); in the experimental group.

Majority of the computer workers in the study were in the age group of more than 25 years 28 (93.3%); were males 22(73.3%); had Bachelors degree 22(73.3%); had more than 3 years of experience in computer use 28(93.3%); had 6-7 hours of computer use/day 23(76.7%); had day shift working time 17(56.7%); had 10-15 minutes of breaks between 2 hours of continuous work 23(76.7%); are practicing refreshment by walking with in the office 12(40%); had once in every 10 seconds of blink rate 30(100%); had good illumination 30(100%); reported no glaring of computer screen 16(53.3%); reported mild level of air cooling and central heating of the work place 18(60%); reported mild humidity of the workplace 21(70%); had seated at 10-15 inches distance 18(60%); reported distance at the eye level 30(100%); they are not taking any treatment for dry eye 23(76.7%); are using corrective spectacles 17(56.7%); they are not using antiglare spectacles 30(100%); are not using antiglare computer screen 20(66.7%); had 6/18 visual acquity for right eye 12(40%); had 6/8 visual acquity for left eye 12(40%); in the control group.

The computer workers in experimental and control groups were not comparable with regard to background factors except, the years of experience in computer use χ^2=4.32(p=0.038), working time χ^2=0.001(p=0.001), blink rates during one hour period of work χ^2= 5.45(p=0.020), and use of antiglare computer screens χ^2= 23.25(p=0.001).

Fig: 3 reveal the frequency and percentage distribution of computer workers regarding Years of experience in using of computer

Majority of the computer workers 22(73.3%) in experimental and control group 28(93.8%) had more than 3 years of experience.

It was inferred that majority had more than 3 years of experience in the computer work χ^2=4.32(p=0.038).

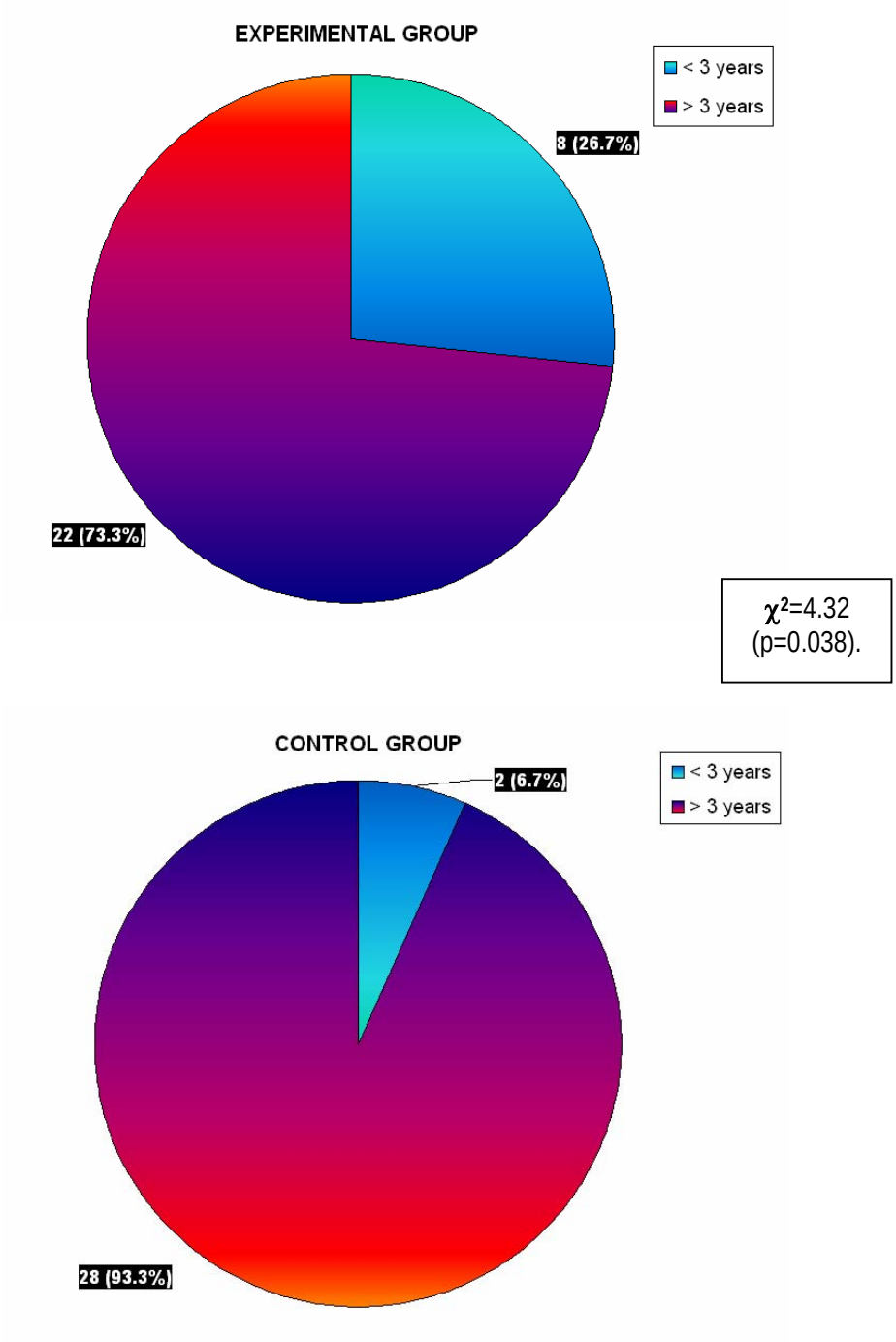

FIG: 3 FREQUENCY AND PERCENTAGE DISTRIBUTION OF COMPUTER WORKERS REGARDING YEARS OF EXPERIENCE IN USING OF COMPUTER

Fig: 4 reveal the frequency and percentage distribution of computer workers regarding working time

Majority of the computer workers in experimental 17(56.6%) and control 17(56.6%) had day shift.

It was inferred that majority of computer workers had day shift $\chi^2 = 0.001(p=0.001)$.

FIG: 4 FREQUENCY AND PERCENTAGE DISTRIBUTION OF COMPUTER WORKERS REGARDING WORKING TIME

Fig: 5 reveal the frequency and percentage distribution of computer workers regarding blink rates during one hour period of work

Majority of the computer workers in experimental 25(83.3%) and control 30(100%) blinked once in every 10 seconds.

It was inferred that majority blinked once in every 10 seconds χ^2=5.45(p=0.020).

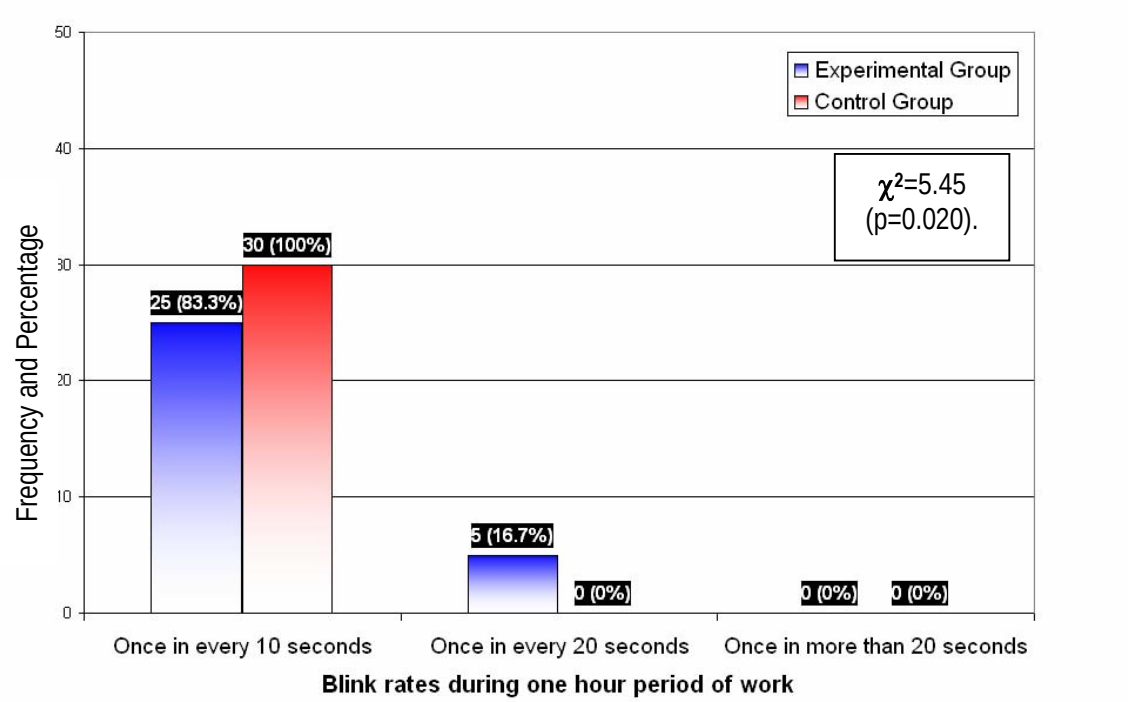

FIG: 5 FREQUENCY AND PERCENTAGE DISTRIBUTION OF COMPUTER WORKERS REGARDING BLINK RATES DURING ONE HOUR PERIOD OF WORK

Fig: 6 reveal the frequency and percentage distribution of computer workers regarding treatment for dry eye.

Majority of the computer workers in experimental 16(53.3%) and control 23(76.6%) in the study reported not taking any treatment for dry eye.

It was inferred that treatment for dry eye among computer workers is not having any association with visual discomfort χ^2 = 4.74(p=0.192).

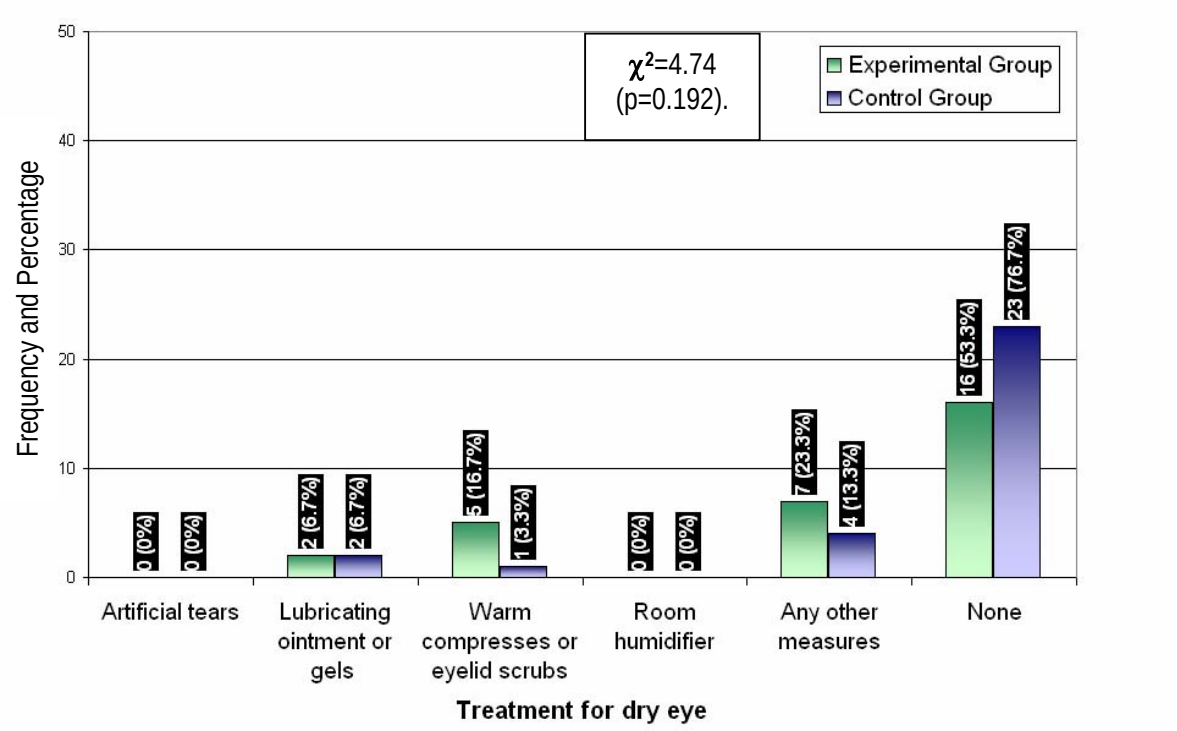

FIG: 6 FREQUENCY AND PERCENTAGE DISTRIBUTION OF COMPUTER WORKERS REGARDING TREATMENT FOR DRY EYE.

SECTION II : DATA ON MEAN PRE AND POST TEST VISUAL DISCOMFORT IN EXPERIMENTAL GROUP .

For the purpose of the study, The following null hypothesis was stated

H_{01}: There will be no significant difference in the mean visual discomfort among computer workers before and after ophthalmic exercise in experimental group.

Table 2:

Mean, range, Mean difference, standard deviation, ' t ' value and Confidence interval of visual discomfort among computer workers in experimental group after ophthalmic exercise.

Group	Level of Visual discomfort after ophthalmic exercise					95% CI		S
	Mean (Maximum score (80)	Range	Difference in Mean difference	SD	' t '	Lower	Upper	
Exp.pre (n=30)	49.9	11		2.8				(P=.001)
			18.43		38.5	17.4	19.4	
Exp.pos (n=30)	31.4	9		2.3				S

S - Significant

Table 2 reveals the effectiveness of ophthalmic exercise by comparison of visual discomfort before and after ophthalmic exercise in experimental group.

The mean difference between the pretest and post test visual discomfort was 18.43. The obtained 't' value 38.5 (p=0.001) was significant. Therefore, null hypothesis (Ho1) was rejected.

It was inferred that the computer workers who practiced ophthalmic exercise had significant reduction in visual discomfort. Therefore ophthalmic exercise was effective.

SECTION III: DATA ON MEAN DIFFERENCE IN VISUAL DISCOMFORT AMONG COMPUTER WORKERS IN EXPERIMENTAL AND CONTROL GROUP.

For the purpose of the study, the following null hypothesis was stated,

H_{02}: There will be no significant difference between the mean difference of visual discomfort among computer workers in experimental and control group

Table 3

Mean difference, Standard deviation, difference in mean difference and ' t ' value on visual discomfort score between experimental and control group

Group	Mean Difference	SD	Difference in mean difference	't'
Experimental group (n=30)	18.43	2.62	-0.07	32.65 (p=0.011) S
Control group (n=30)	18.50	1.66		

Table 3 reveals the mean difference, Standard deviation, difference in mean difference and 't' value on visual discomfort score between experimental and control group.

The mean difference on visual discomfort score among computer workers in experimental group 18.43 (SD = 2.62) was less than the control group 18.50(SD = 1.66). The obtained difference in mean difference was -0.07. The obtained 't' value, t=32.65, (p=0.011) was significant. Therefore, null hypothesis H02 was rejected.

It was inferred that the computer workers who practiced ophthalmic exercise had significant reduction in visual discomfort when compare with control group. Therefore ophthalmic exercise was effective.

SECTION IV: DATA ON ASSOCIATION BETWEEN MEAN DIFFERENCE IN VISUAL DISCOMFORT AMONG COMPUTER WORKERS AND THEIR BACKGROUND FACTORS IN EXPERIMENTAL GROUP.

For the purpose of the study, the following null hypothesis was stated

H_{03}: There will be no significant association between the mean difference in visual discomfort and background factors among computer workers in experimental group.

Table 4

Linear regression on association between visual discomfort among computer workers and their background factors in experimental group .

Background factors	β	't'	p	95% CI	
				Lower	Upper
Age __Years.	.09	.19	.84 (NS)	-5.58	6.70
Gender	.10	.38	.70 (NS)	-2.28	3.25
Educational qualification	-.19	-.42	.68 (NS)	-8.13	5.49
Years of experience in using computer	.36	.80	.43 (NS)	-3.25	7.06
Average use of computer / day (hours)	-.15	-.40	.69 (NS)	-4.99	3.42
Working time	-.05	-.14	.89 (NS)	-4.16	3.66
Breaks during Video Display Terminal work	.26	1.08	.30 (NS)	-1.10	3.27
Using of break time to refresh your eyes	-.03	-.08	.93 (NS)	-2.43	2.25

Background factors	β	't'	p	95% CI	
				Lower	Upper
Blink status during one hour period of work?	-.13	-.53	.60 (NS)	-4.23	2.55
Glittering or glaring of the screen	-.009	-.02	.98 (NS)	-2.52	2.47
Level of Air cooling and central heating of the workplace	-.48	-.86	.4 (NS)	-8.42	3.65
Humidity of the workplace	.54	.95	.35 (NS)	-3.98	10.21
Distance between seat and screen during work time	.31	.50	.62 (NS)	-4.93	7.93
Treatment for dry eye	.11	.24	.81 (NS)	-1.52	1.90
Wearing of corrective spectacles	-.16	-.23	.82 (NS)	-7.94	6.42
Using of antiglare computer screens	-.12	-.48	.63 (NS)	-6.50	4.13

Table 4 reveals the significant association between the mean difference in visual discomfort and the background factors among computer workers in experimental group.

The obtained ' t ' values regarding age, gender , educational qualification , years of computer use, work factors had no significant association with the mean difference in visual discomfort in experimental group. Therefore null hypothesis Ho3 was accepted and research hypothesis was not accepted.

It was inferred that ophthalmic exercise was effective. The visual discomfort was reduced independent of the background factors of computer workers in experimental group.

CHAPTER – V

SUMMARY , FINDINGS, DISCUSSION, IMPLICATIONS, LIMITATIONS, RECOMMENDATIONS AND CONCLUSION

This chapter is devoted to the consideration of the findings, understanding, limitation of the results, and recommendations that incorporate the application of the study. It also gives meaning to the results obtained in the study.

SUMMARY

The primary aim of the study was to assess the visual discomfort among computer workers before and after ophthalmic exercise.

THE OBJECTIVES OF THE STUDY

- To compare the mean pre test and post test visual discomfort among computer workers in experimental group in relation to ophthalmic exercises.
- To compare the mean difference in visual discomfort among computer workers in experimental and control group
- To find the association between selected background factors and mean difference in visual discomfort among computer workers in experimental and control group.

HYPOTHESIS

- H_1 - There will be a significant difference in the mean visual discomfort among computer workers after ophthalmic exercises in experimental group.
- H_2 - There will be a significant difference between the mean difference of visual discomfort among computer workers after ophthalmic exercises in experimental and control group.
- H_3 - There will be a significant association between the mean difference in visual discomfort and background factors among computer workers in experimental group.

The review of literature on related studies helped the investigator to design the methodology, conceptual framework and develop the tool. The literature review was done under the following heading. Studies related to visual discomfort in computer workers, Studies related to Healthful working environment for computer workers, and Studies related to effectiveness of ophthalmic exercises for visual discomfort computer workers.

The conceptual framework of this study was developed by the investigator based on nursing process model – ANA (2003)

The research approach adopted for the study was a quasi experimental design. Setting chosen to conduct the study was, Soft bee private consultancy, Ltd, company, Bangalore. The target population in the study were computer workers.

60 Samples were selected through convenience sampling technique, in Experimental group 30, and in control group 30. The tool used was self administered questionnaire to collect information on visual discomfort. The Correlation coefficient was calculated by karl pearson

correlation coefficient method and r= 0.83 was high. After obtaining informed consent from the participant's pilot study was conducted among 10 computer workers who were similar to study population.

Data was collected for 4 weeks in the month of October 2010. Computer workers were very cooperative and showed interest in participating in study. Data analysis and interpretation were done based on objectives of the study. The data gathered were analyzed using SPSS version 17 was used. A probability of less than 0.05 was considered to be significant.

CHARACTERISTICS OF THE STUDY SAMPLE

Majority of the computer workers in the study were in the age group of more than 25 years 25(83.3%); were females 17(56.7%); had Bachelors degree 26(86.7%); had more than 3 years of experience in computer use 22(73.3%); had 6-7 hours of computer use/day 22(73.3%); had day shift working time 17(56.7%); had 10-15 minutes of breaks between 2 hours of continuous work 16(53.3%); had practicing of relax and keeping the eyes closed 13(43.3%); had once in every 10 seconds of blink rate 25(83.3%), had good illumination 30(100%); reported no glaring of computer screen 21(70%); reported mild level of air cooling and central heating of the work place 20(66.7%); reported mild humidity of the workplace 24(80%), had seated at 10-15 inches distance 19(63.3%); reported distance at the eye level 30(100%); they are not taking any treatment for dry eye 16(53.3%); not using corrective spectacles 16(53.3%); they are not using antiglare spectacles 30(100%); had antiglare computer screen 28(93.3%); had visual acquity for right eye 16(53.3%); had visual acquity for left eye 16(53.3%), %) in the experimental group.

Majority of the computer workers in the study were in the age group of more than 25 years 28 (93.3%); were males 22(73.3%); had Bachelors degree 22(73.3%); had more than 3 years of experience in computer use 28(93.3%); had 6-7 hours of computer use/day 23(76.7%); had day shift working time 17(56.7%); had 10-15 minutes of breaks between 2 hours of continuous work 23(76.7%); are practicing refreshment by walking with in the office 12(40%); had once in every 10 seconds of blink rate 30(100%); had good illumination 30(100%); reported no glaring of computer screen 16(53.3%); reported mild level of air cooling and central heating of the work place 18(60%); reported mild humidity of the workplace 21(70%); had seated at 10-15 inches distance 18(60%); reported distance at the eye level 30(100%); they are not taking any treatment for dry eye 23(76.7%); are using corrective spectacles 17(56.7%); they are not using antiglare spectacles 30(100%); are not using antiglare computer screen 20(66.7%); had 6/18 visual acquity for right eye 12(40%); had 6/8 visual acquity for left eye 12(40%) in the control group.

FINDINGS

The findings of the study was presented according to the objectives of the study.

OBJECTIVE 1 : TO COMPARE THE MEAN PRETEST AND POSTTEST VISUAL DISCOMFORT AMONG COMPUTER WORKERS IN EXPERIMENTAL GROUP IN RELATION TO OPHTHALMIC ESERCISE.

- There was a significant reduction in the mean visual discomfort score after the ophthalmic exercise in the experimental group, t=38.5(p=.001).

OBJECTIVE 2 : TO COMPARE THE MEAN DIFFERENCE IN VISUAL DISCOMFORT AMONG COMPUTER WORKERS IN EXPERIMENTAL AND CONTROL GROUP

- There was a significant reduction in mean difference visual discomfort, t=32.65(p=.011) in the experimental group than the control group regarding ophthalmic exercise.

OBJECTIVE 3 : TO FIND THE ASSOCIATION BETWEEN BACKGROUND FACTORS AND MEAN DIFFERENCE IN VISUAL DISCOMFORT AMONG COMPUTER WORKERS IN EXPERIMENTAL AND CONTROL GROUP.

- There was no significant association between the mean difference in visual discomfort score and the background factors such as, age, gender , educational qualification , years of computer use, work factors in experimental group.

DISCUSSION

The results of the study were discussed based on the findings of the study.

Findings 1 : Findings on visual discomfort among computer worker in experimental and control group in relation to ophthalmic exercise.

- There was a significant reduction in the mean visual discomfort score after the ophthalmic exercise in the experimental group, t=38.5(p=.001).

Mandal G M et.al.,(2007), conducted a study regarding Computer Vision Syndrome (CVS) and the Effects of Yoga Eye Practice. A group of 14 adults were selected randomly, these included 10 males and 4 females in the age group of 20-45. The yogic eye practices include preparatory eye and types of palming was done after each practice. The statistically significant paired 't' test result obtained for increased tear break up, shows that yogic eye practices definitely help in improving the tear film of the eyes, thereby reducing the symptoms arising out of computer use.

Findings 2: Findings on mean difference in visual discomfort among computer worker in experimental and control group in relation to ophthalmic exercise.

- There was a significant reduction in the mean visual discomfort score after the ophthalmic exercise t = 32.65(p=0.011) in the experimental group than the control group.

Beresford S M et.al.,(2007), Method of relieving computer vision syndrome .This intervention comprises a method that enables a computer user to relieve or avoid computer vision syndrome by means of eye exercises and stress reduction techniques. He determined that certain groups and sequences of exercises produce the best results.

Telles S et.al.,(2006) done a study on Effect of yoga exercise on self-rated visual discomfort in computer users at Bangalore. Among 291 professional computer users were randomly assigned to two groups, yoga (YG, n = 146) and wait list control (WL, n = 145). The scores for visual discomfort of both groups were comparable at baseline, after 60 days there was a significantly decreased score (F=15.36,P<.001) in the YG group, whereas the WL group showed significantly increased scores. The results suggest that the yoga practice and visual cleansing exercise appeared to reduce visual discomfort.

Finding 3 : Findings on association between the mean difference in visual discomfort and background factors among computer workers in experimental group.

- There was no significant association between the mean difference in visual discomfort score and the background factors such as, Age, gender , educational qualification , years of computer use, work factors in experimental group.

Bhanderi D J et.al.,(2008) conducted a study regarding A community-based study of asthenopia in computer operators. Among the 419 subjects studied, 194 (46.3%) suffered from asthenopia during or after work on computer. Marginally higher proportion of asthenopia was noted in females compared to males. Prevalence of asthenopia was noted to be quite high among computer operators, particularly in those who started its use at an early age.

IMPLICATION

The findings of the study have the following implication in nursing

Implication for nursing practice

- Ophthalmic exercise is an effective measure to reduce the visual discomfort . Nurse should effectively use this measure to alleviate computer related visual discomfort.
- Ophthalmic exercise helps in reducing the vision site problems.
- Nurses can plan the goal of nursing management and enhance the nurse worker relationship and sense of well being to the workers through the development of mutually agree goals.

- Nurse educate individuals employed in computer related jobs to practice these exercise.

Implication for nursing education

- Ophthalmology is a part of nursing curriculum, intervention like ophthalmic exercise need to learnt and practiced.
- Nurse student should provided adequate training regarding ophthalmic exercises.
- In service education programme should be conducted for nursing personnel and help nurses to gain knowledge on reduction of visual discomfort through ophthalmic exercise.

Implications for nursing research

- The study will be valuable reference and pathway for further researchers.
- The findings of the study would help to expand the scientific body of professional knowledge upon which further researchers can be conducted.
- Eye exercise may be studied more scientifically and used as a specific nursing intervention for vision problems.

LIMITATION

- The samples were selected by non random method limiting the generalisability.
- The intervention was given only for 2 weeks.
- Pharmacological management of computer related visual discomfort were beyond the control of investigator.
- Frequent break for exercise was not received with comfort , thinking as a wastage of time.

RECOMMENDATIONS

- Similar study can be conducted in other workers such as data entry workers in hospitals, call center workers, etc.
- Similar study can be conducted for a larger group

CONCLUSION

The following conclusion were drawn from the findings.

The computer workers in experimental group had reduction in visual discomfort score after ophthalmic exercise . So in addition to the treatment ophthalmic exercise can be used for managing visual discomfort among computer workers.

CHAPTER – VI

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APPENDIX -I

LETTER REQUESTING OPINION AND SUGGESTION OF EXPERTS FOR ESTABLISHING CONTENT VALIDITY OF RESEARCH TOOL

From
30093603
II year M.Sc (Nursing),
Annai J K K Sampoorani Ammal College of Nursing
Komarapalayam,
Namakkal district.

To

Through
The Dean,
Annai J K K Sampoorani ammal College of Nursing,
Komarapalayam,
Namakkal District.

Respected Madam/sir

Sub: Letter requesting consent to validate the tool.

I am 30093603, II year M.Sc., Nursing student of Annai JKK Sampoorani Ammal College of Nursing Komarapalayam, under the Tamil Nadu Dr. M G R Medical University, Chennai.

As a partial fulfillment of M.Sc Nursing Programme, I am conducting a research. Topic which I am going to do is **"A study to assess effectiveness of ophthalmic exercises on visual discomfort among computer workers in selected company, Bangalore."**

Herewith I am sending the tool for content validity for your expert opinion. I humbly request yourself to spare a little of your valuable time for me which I remain ever grateful to you. I would be very kind of you to return the same undersigned at the earliest.

Thanking you

Place: Komarapalayam, Yours sincerely

Date: 13/ 09/2010 (30093603)

APPENDIX –II

LIST OF EXPERTS

1. DR.M.KRISHNAN M.s., DGO

Rangachari eye hospital

Krishnagiri.

2.DR. RADHAKRISHNAN,MBBS, Ms

Sri Arunachalla hospital

Krishnagiri

3. Mrs.SARAMMA, Msc (N)., Ph.D

Professor

Dept of Medical surgical (N)

Sree chitra tirunal institute of medical science and technology

Thiruvanandhapuram.

4. Mrs.JESSIE SUDHARSANAM, Msc (N)

Professor

Dept of Medical surgical (N)

Annai J K K Sampoorani Ammal College of Nursing

5. Mrs.SHOBANA, Msc (N)

Associate Professor

Dept of Medical surgical (N)

Annai J K K Sampoorani Ammal College of Nursing

APPENDIX – III

CONTENT VALIDITY CERTIFICATE

I hereby certify that I have validated the tool of **30093603**, II M.Sc (Nursing), student who is undertaking research on **"A study to assess effectiveness of ophthalmic exercises on visual discomfort among computer workers in selected company, Bangalore."**

Place: Komarapalayam Signature of the Expert

Date: Designation

APPENDIX –IV

PERMISSION LETTER

From

30093603
II year M.Sc (Nursing),
Annai J K K M Sampoorani Ammal College of Nursing
Komarapalayam,638183
Namakkal district.

To

The Managing Director
Mr. Visvanath Nachundaya
Soft bee Consultancy Private Limited
87,205 Sheshlabhumi, K.R Road,
Bangalore

Through

The Dean,
Annai J K K Sampoorani ammal College of Nursing,
Komarapalayam,
Namakkal District.

Respected Madam/sir

Sub: Seeking permission to conduct the research study

I am 30093603, II year M.Sc., Nursing student of Annai JKK Sampoorani Ammal College of Nursing Komarapalayam, under the Tamil Nadu Dr. M G R Medical University, Chennai.

As a partial fulfillment of M.Sc Nursing Programme, I am conducting a research. Topic which I am going to do is **"A study to assess effectiveness of ophthalmic exercises on visual discomfort among computer workers in selected company, Bangalore."**

I would like to conduct this research study in your esteemed institution. Hence I request you to kindly grant permission for the same.

Thanking you

Place: Komarapalayam, Yours sincerely
Date: 30093603

APPENDIX – V

Soft bee
ISO 9001:2008 Certified Company

Date : 01-Oct-2010

TO

The Dean
Annai J.K.K.M Sampoorani Ammal College of Nursing
Komarapalayam – 638183
Namakkal District – TN

Dear Sir,

This is further to your latter dated 28-09-2010 in regard to the project work at our organization. We are happy to permit your student Ms. J. Petrisia to do the project title **" A Study to assess effectiveness of ophthalmic exercises on visual discomfort among computer workers in Softbee Consultancy Services Pvt. Ltd., Bangalore "**

among

Thank you

Regards,

for.

Vishwanath .N.
Managing Director
Softbee Consultancy Services Pvt. Ltd.

APPENDIX – VI

QUESTIONNAIRE ON VISUAL DISCOMFORT AMONG COMPUTER WORKERS

SECTION – A: BACKGROUND FACTORS Code No :_____

INSTRUCTION:

This section seeks information about you . Kindly place the (✓) mark against the appropriate choice that suits you or fill in the blanks.

BACKGROUND FACTORS

17. Age _____ years
    a. less than 25 years ☐
    b. More than 25 years ☐
17. Gender
    a. Male ☐
    b. Female ☐
17. Educational qualification
    a. Diploma ☐
    b. Bachelors degree ☐
    c. Master's degree ☐
    d. Any other qualification_____(specify) ☐
17. State the years of experience in using computer_____ year's _____ months.
    a. Less than 3 years ☐
    b. More than 3 years ☐

WORK FACTORS

17. State the average use of computer / day (hours)?
    a. 1 – 3 ☐
    b. 3 – 5 ☐
    c. 6 - 7 ☐
    d. > 7 (More than 7 hours) ☐

17. Working time

a. Day time ☐

b. Night time ☐

17. How do you take breaks during Video Display Terminal work?

a. No breaks ☐

b. 5 minutes at each one hour intervals ☐

c. 10 – 15 minutes breaks between 2 hours of continuous work ☐

d. One hour at the end of the work period ☐

e. Any other _____(specify). ☐

17. How did you use these break times to refresh your eyes ?

a. Going out from the office ☐

b. Walking with in the office ☐

c. Looking nearby objects away from the monitor site ☐

d. Relax and keeping the eyes closed ☐

e. Blinking activity ☐

f. Any other measures_____(specify) ☐

17. How often did you blink your eyes during one hour period of work ?

a. Once in every 10 seconds ☐

b. Once in every 20 seconds ☐

c. Once in More than 20 seconds ☐

17. How well is your working room illuminated ?

a . Very poor illumination ☐

b. Very high illumination ☐

c. Good illumination. ☐

17. How well your screen is glittering or glaring ?

a. No glare ☐

b. Too dull ☐

c. Too bright ☐

17. How did you feel the level of Air cooling and central heating of the workplace ?

a. Mild ☐

b. Moderate ☐

c. Severe ☐

17. How well is your Humidity of the workplace ?

a. Mild ☐

b. Moderate ☐

c. severe ☐

17. State the distance between seat and screen during work time?

a. 10 - 15 inches ☐

b. 16 – 20 inches ☐

c. 21 – 25 inches ☐

d. More than 25 inches ☐

17. Distance between Eye level of screen ?

a. Above the eye level ☐

b. At the eye level ☐

c. Below the eye level ☐

16. Do you use any of the following treatment for dry eye?

a. Artificial tears ☐

b. Lubricating ointment or gels ☐

c. Warm compresses or eyelid scrubs ☐

d. Room humidifier ☐

e. Any other measures_____(specify) ☐

f. None

17. Are you wearing corrective spectacles?

a. Yes ☐

b. No ☐

18. Are you using antiglare spectacles ?

a. Yes ☐

b. No ☐

19. Are you using antiglare computer screens ? ☐

a. Yes ☐

b. No

20. Visual acquity for Right eye _____ Left eye _____

SECTION B : DATA ON VISUAL DISCOMFORT

INSTRUCTION:

The statement following given are certain problems related to eyes which using to conform visual discomfort. State how much you had experience in your working hours . Kindly read the visual discomfort problems listed and place a (✓) mark in the appropriate column. Please do not leave any items unnecessarily.

VISUAL DISCOMFORT PROBLEM	NEVER	RARELY	SOMETIMES	FREQUENTLY	CONSTANTLY
1. Fatigue in the eyes during working hours					
2. Pain in the eyes during a day of working hours					
3. Double vision during working hours					
4. Blurred vision during working hours					
5. Dry sensation during working hours					
6. Excess blinking while looking at the computer					

7. Head ache during or after working at the computer
8. Irritation during working at the computer
9. Redness of the eyes during a day of work
10. Burning sensation at computer work
11. Squinting helps when looking at the computer
12. Neck , shoulder or back pain during a day of working hours

13. Feeling tired or sore during a typical day of work
14. Halos appear around objects on the screen
15. Letters on the screen run together during work at the computer
16. Driving / Night vision is worse after computer use

17. Gritty and scratchy feeling during working hours
18. Stinging eyes while looking at the computer
19. .Eyes look or feel excessively watery during a day of work
20. .Crusty material or mucus are around your eyes during working hours

APPENDIX – VII

BLUE PRINT ON VIDEO TEACHING PROGRAMME ON OPHTHALMIC EXERCISE FOR COMPUTER WORKERS

INTRODUCTION

Computer is a vital tool in every dimensions. Regular computer users are at risk to develop visual discomfort and problems related to eyes. Surveys reveal that 70% of computer workers suffer from vision related problems. American optometric association estimates that at least 10 million cases of computer related eye strains were reported each year. Eye exercises relieve problems related to eye strain, dry eyes, blurry eyes, headaches and fatigue etc.

Objectives

The goal of eye exercises is to relieve the effects of eye strain and dry eyes, and Common symptoms associated with eye strain , blurry eyes, headaches and fatigue etc.

Preparatory Phase:

- Explain the procedure and the effect of eye exercise to the computer workers.
- Give assurance to the workers in such a way that the procedure will not harm to the eyes.
- Maintain comfortable seat to perform this exercise.

Eye Exercise

- Palming
- Slow blinking
- squeeze blinking
- Rotate the eye balls
- Shifting the gaze with eight directions

PALMING

- Sit down in a comfortable chair.
- Warm your hands by rubbing them together.
- Cup your palms and place them over your closed eyes.
- Position them so that you do not apply any pressure to the actual eyeball.
- Your hands should be positioned in a manner that leaves the nose uncovered.
- Make certain that all the fingers are tightly positioned together so no light rays can penetrate beyond the hands.
- Take long, slow, deep breaths while thinking of scenarios that bring you happiness.
- After a few deep breaths, relax and open your eyes.
- Repeat this pattern for about three minutes.

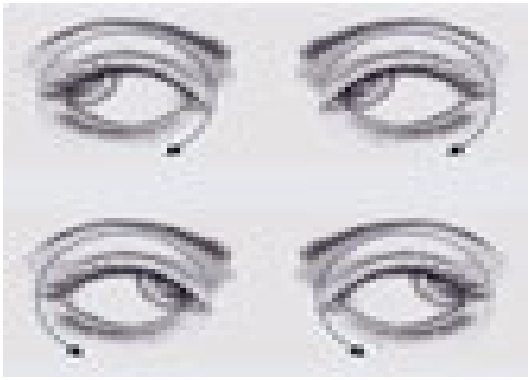
SLOW BLINKING

- This exercise involves breathing deeply and looking at a small detail on a distant object when inhaling.
- When exhaling, the eyes are kept closed and relaxed.

SQUEEZE BLINKING

- This exercise involves breathing deeply and looking at a small detail on a distant object when inhaling.
- When exhaling, the eyelids are squeezed tightly.

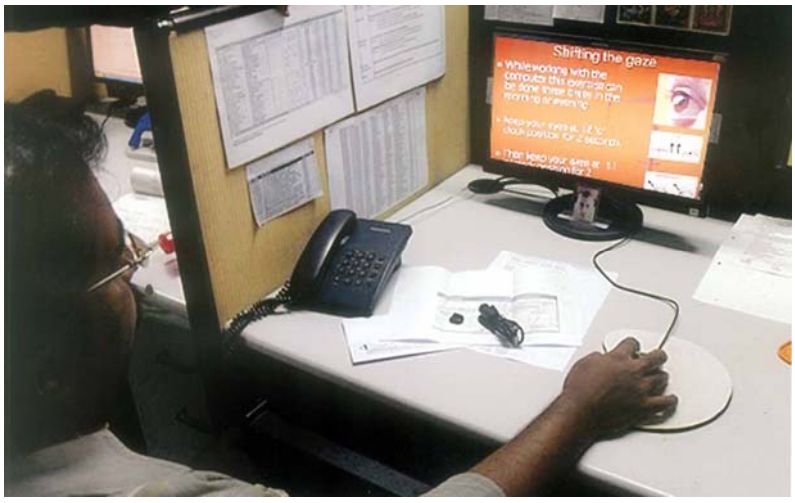
ROTATE THE EYE BALLS

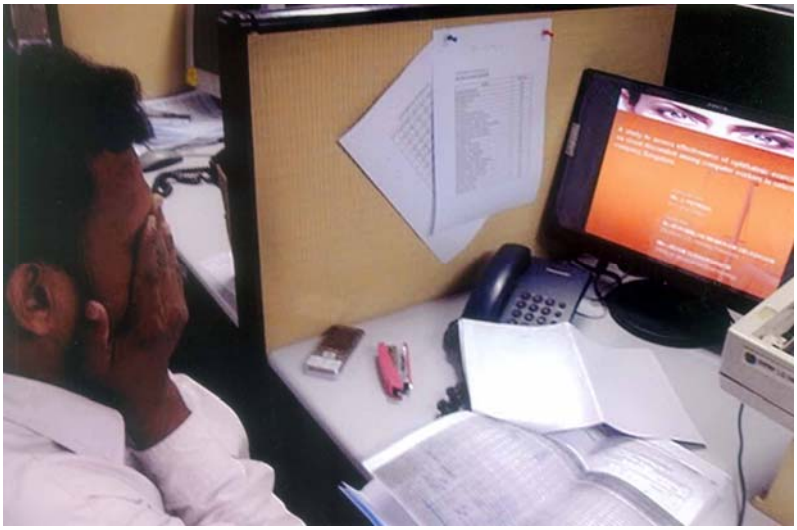


- While you keep your eyes opened, roll your eyeballs both clockwise and anticlockwise and take a deep breath.
- Gradually open your eyes while releasing your breath. Continue this Exercise for a Minute or two.
- You can repeat it three times before getting back to work.

SHIFTING THE GAZE

- While working with the computer three time once, two hours a day in the morning or evening
- keep your eyes at 12 ‘o’ clock position for 2 seconds.
- Then keep your gaze at 11.30 or 11 ‘o’ clock position for 2 seconds
- Keep your gaze at 9 ‘o’ clock position for 2 seconds.
- Keep your gaze at 7.30 or 7 ‘o’ clock position for 2 seconds.
- Next keep your gaze at 6 ‘o’ clock position for 2 seconds.
- Keep your gaze at 4.30 or 4 ‘o’ clock position for 2 seconds.
- Keep at 3 ‘o’ clock position for 2 seconds.
- Keep at 1.30 or 1 ‘o’ clock position for 2 seconds.


Shifting the gaze



ABSTRACT

A study to assess effectiveness of ophthalmic exercises on visual discomfort among computer workers in selected company, Bangalore , as a partial fulfillment of the requirements for the award of the degree of Master of Science in nursing was done by 30093603, from Annai J.K.K Sampoorani Ammal College Of Nursing, Komarapalayam, under the TamilNadu Dr. M.G.R. Medical University, Chennai, April 2010-2011.

The objectives of the study were,1) To compare the mean pre test and post test visual discomfort among computer workers in experimental group in relation to ophthalmic exercises. 2)To compare the mean difference in visual discomfort among computer workers in experimental and control group and 3)To find the association between background factors and mean difference in visual discomfort among computer workers in experimental and control group.

The research hypothesis formulated were, H1 - There will be a significant difference in the mean visual discomfort among computer workers after ophthalmic exercises in experimental and control group, H2 - There will be a significant difference between the mean difference of visual discomfort among computer workers after ophthalmic exercises in experimental and control group, andH3 – There will be a significant association between the mean difference in visual discomfort and background factors among computer workers in experimental and control group.

Literature review was done for the present study was, Studies related to visual discomfort among computer workers, Studies related to healthful working environment among computer workers, Studies related to ophthalmic exercises for visual discomfort among computer workers.

The conceptual framework was based on Nursing process model (ANA 2003). The research design used was pretest, posttest experimental research design. Study was conducted among 60 computer workers (30 experimental and 30 control). The samples were selected by using convenience sampling technique. The self administered structured visual discomfort questionnaire was used for data collection.

The structured self administered questionnaire used for data collection was validated by 5 experts. Reliability was established by test re- test method and the reliability coefficient was found to be r=0.87. Pilot study was conducted among 10 computer workers. The main study was conducted in Soft bee private consultancy, Ltd, Company at Bangalore . The data were analyzed and interpreted using SPSS version 17 software.

The findings of the study revealed that visual discomfort of computer workers were high compared at 0.05 level of significance. The computer workers had significant reduction in the mean visual discomfort score after ophthalmic exercise in the experimental group, t=38.5(p=.001). Implications, limitations, and recommendations were clearly defined and stated adequately.